

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

I. Claim Status

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claims remain under examination in the application, is presented, with an appropriate defined status identifier.

Claims 1, 4-6 and 11 are currently being amended. Support for the amendments can be found throughout the Specification, for example in the original claim 3 and Tables 2 and 6. No new matter is added.

After amending the claims as set forth above, claims 1-2 and 4-14 are now pending in this application. Claims 3 and 15-16 are cancelled without prejudice or disclaimer.

II. Claim Rejections under 35 U. S. C. §§ 102 & 103 Over Miyata and Kamisuki

Claims 1 and 3 are rejected under 35 U.S.C. § 102(b) as being anticipated by Miyata (US 6,300,226 to Miyata et al.). Claim 2 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Miyata, and as evidenced by Kamisuki (US 6,436,361 to Kamisuki). Applicants respectfully traverse the rejections for the following reasons.

Claim 1 as amended recites a silicon carbide product free from any sintering agent, which is used in manufacturing a semiconductor device and/or a dummy wafer of the silicon carbide being cleaned, the silicon carbide product having a surface with a concentration of metal impurities equal to or less than 1×10^{11} atoms/cm².

Miyata teaches a silicon carbide product that has different grain characteristics either on its surface or within the main structure (*see* Miyata, Abstract). Miyata further teaches that the

bulk SiC contains an extremely low amount of metallic impurities such as 1×10^{10} atom/cm² or less measured by a total reflection X-ray fluorescence analysis (*see* Miyata, Column 5, Lines 60 to 63). However, Miyata is completely silent as to the metallic impurities on the surface of the SiC material, in contrast to what is recited in claim 1, as the total reflection X-ray fluorescence analysis inherent used in Miyata would inherently test the bulk, rather than the surface, metallic impurities.

Consistently, Miyata is silent as to any surface treatment of the SiC after the CVD process. Miyata is also silent regarding cleaning the surface of the SiC product that is undesirably contaminated during a process of manufacturing a semiconductor device and/or a dummy wafer, which may make it difficult to obtain theoretical properties of the SiC product, in contrast to the disclosure on Page 5, Lines 10 to 24 of the instant Application. In other words, Miyata is clearly not directed to clean the SiC product before manufacturing a semiconductor device and/or a dummy wafer, in accordance with the above observation that the 1×10^{10} atom/cm² or less the metallic impurities only refer to a bulk contamination, rather than a surface one that is recited in claim 1.

Accordingly, the section 102 rejection over claim 1 should be withdrawn, as Miyata fails to teach all of the limitations recited in claim 1. Claim 3 is cancelled without prejudice or disclaimer, rendering moot the section 102 rejection over it.

Kamisuki is cited for disclosing other features of dependent claim 2, but fails to cure the above-explained deficiencies of Miyata. *A prima facie* obviousness is therefore not established. The section 103 rejection over claim 3 should be withdrawn accordingly.

III. Claim Rejections under 35 U. S. C. §§ 102& 103 Over Tanino, Holmes, Ariga and Lin

Claims 4-8 and 14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanino (US 6,187,279 to Tanino et al.), as evidenced by Holmes (US 5,770,324 to Holmes et al.). Claims 6 and 9-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanino and Holmes, and further in view of Ariga (JP 11-008216 to Ariga et al.). Claims 11-13 are

rejected under 35 U.S.C. § 103(a) as being unpatentable over Tanino and Holmes, and further in view of Lin (US 7,037,816 to Lin). Applicants respectfully traverse the rejections for the following reasons.

Independent claims 4 and 5 as amended recite that each of the iron or iron compound, Ni or Cu impurities is reduced by the acidic solution at a removal ratio (%) which is not smaller than 98%, wherein the removal ratio is represented by $(100 - (\text{amount after cleaning} / \text{amount before cleaning})) \times 100$.

Tanino discloses a single crystal SiC manufactured by laminating single crystal alpha SiC substrate and a polycrystalline beta SiC substrate. The SiC substrates are washed by a solvent, a supersonic wave, or hydrofluoric acid to dry them (*see* Tanino, Column 3, Lines 37-42). However, Tanino fails to teach removing metallic impurities from the single crystal SiC, let alone a removal ratio of metal impurities on the surface of the single crystal SiC, in contrast to claims 4 and 5.

Holmes is cited for disclosing other features of the claims, but fails to cure the above-explained deficiencies of Tanino. Specifically, Holmes discloses a hot pressed silicon carbide dummy wafer and requirements of 10^{10} atoms/cm² for surface metals and 10^{11} atoms/cm² for bulk metals (*see* Holmes, Column 2, Lines 32-39), where the cleaning is exemplified in Column 3, Lines 49-67. However, Holmes intentionally excludes using CVD monolithic silicon carbide as a dummy wafer (*see* Holmes, Column 1, Lines 54 to 56), indicating that Holmes is merely directed to the hot pressed silicon carbide dummy wafer alone.

Ariga is cited for disclosing other features of dependent claims 6 and 9-10, but fails to cure the above-explained deficiencies of Tanino and Holmes. Specifically, Ariga discloses a silicon carbide member used in a reactor tube, a holding tube, a transportation tray, a wafer boat, a support base, and the like, which has a lot of voids. Ariga therefore teaches, during impregnation of the metallic silicon, which is performed to improve the weak mechanical strength of the Ariga SiC due to the voids, to avoid pollution of Fe, Cu, Ni, and the like.

Specifically, Ariga discloses a method of cleaning a semiconductor manufacturing member that has a silicon carbide material on a surface portion by forming a silicon oxide film on the surface portion and then removing the silicon oxide film formed by a mixed acid of fluorinated acid (HF), a mixture of fluorinated acid and hydrochloric acid, a mixture of fluorinated acid and nitric acid, or a mixture of fluorinated acid and sulfuric acid. As a result, the cleaning method disclosed in Ariga is only applicable to a semiconductor manufacturing member, such as the reactor or furnace, in contrast to the method for cleaning a semiconductor device and/or a dummy wafer recited in instant claims. Furthermore, even after repeating the above-mentioned cleaning process for five times, as illustrated in Figure 5 of Ariga, the amount of iron still can **not** be reduced to 1×10^{10} atoms/cm², although that the amounts of Cu and Ni are reduced to a lesser amount.

Lin is cited for disclosing other features of dependent claims 11-13, but also fails to cure the above-explained deficiencies of Tanino and Holmes.

For at least the above reasons, a *prima facie* obviousness is not established. The section 103 rejections over Tanino, Holmes, Ariga and Lin should be withdrawn accordingly.

IV. Conclusion

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by the credit card payment instructions in EFS-Web being incorrect or absent, resulting in a rejected or incorrect credit card transaction, the Commissioner is authorized to charge the unpaid amount to

Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date September 23, 2011

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